MGMA METAL GUTTER MANUFACTURERS' ASSOCIATION

RECYCLABILITY OF METAL GUTTER SYSTEMS

EXECUTIVE SUMMARY

Over the past forty to fifty years there has become an ever-increasing awareness of environmental issues and the need for sustainable development. The construction sector is the biggest producer by volume of waste in the country. There are initiatives such as Zero Avoidable Waste (ZAW) in construction which is aimed at the overall reduction of waste, and the minimisation of waste to landfill to improve material resource efficiency.

The use of metal gutter systems on a building can contribute to achieving a sustainable drainage solution to meet both current and future needs and requirements, thanks to their low maintenance, long durability, high recycled content, reuse capability and material recyclability.

Metal gutter systems and their accessories (i.e. support brackets, downpipes metal fascia, metal soffit etc.) are individual components which follow the Design for Disassembly (DfD) principle and can be easily dismantled and dissembled at the end of the building's life and either reused on other similar buildings or collected and sorted for recycling. On industrial type buildings the use of a factory assembled gutter system utilising loose laid high density rockfibre insulation is becoming more prevalent enabling the DfD principles to be adopted.

The recovery infrastructure for metal recycling is highly developed and highly efficient and has been in place for decades. Metals also have an intrinsic scrap value, (some such as aluminium, copper etc. being higher than others) which also gives a financial incentive to recycle. Metals can also be recycled repeatedly without losing their qualities for further use in the same or similar products. Percentage wise recovery rates of metals used in construction is in the high 90s.

One of the key factors in metal recycling is the reduction of energy, and subsequent CO2 emissions, that is required to produce material from scrap metal ('secondary' metal) as opposed to producing 'primary' metal from raw materials. In the case of aluminium and zinc this can be as high as 95% reduction, with copper between 60% and 85% and with steel

energy reductions can be between 65% and 75%. The use of scrap metal is seen as a valuable resource in the production of new material reducing the need for fewer natural resources.

The separation of individual metals from each other and other waste is an important step in the overall recycling process. One of the advantages of steel is that it is magnetic so making it the easiest metal to recover from mixed waste. Ferrous steel is usually separated from non-ferrous metals by use of magnets, e.g. large overhead magnets, eddy current magnets etc. Aluminium can be separated from other non-ferrous metals and other materials in a dense media separator, also known as sink float separation, where waste material is passed through a series of baths which have a water based slurry of increasing known densities. At each bath materials of higher density will sink and those with lower densities will float enabling separation to take place.

In each metal production industry there are different melting processes which can be used dependent upon the condition (e.g. uncoated or coated) and quality of the scrap metal. Most of the common materials used in metal gutter systems; steel, cast iron and aluminium will invariably have a paint coating. In the melting process paint and other are destroyed without any environmental impacts allowing the metal to be fully recovered.

Metal gutter systems as with other construction products can be subject to a life cycle assessment (LCA) which assesses their environment impact such as raw material usage, energy usage and release of emissions, through all stages of its life and disposal or continued life through reuse or recycling. The results of an LCA are published in an Environment Product Declaration (EPD) which is developed in a common format with the overall goal of communicating verifiable and accurate information on the environmental aspects of products that are not misleading.

MGMA members' EPDs for their products and systems based on LCAs can assist designers and specifiers to obtain points and credits within environmental rating and certification schemes such as BREEAM and LEED.

Life Cycle Costing (LCC) considers all relevant costs over the defined life of a building covering construction costs, operation and occupancy costs, maintenance costs, renewal costs, and end of life costs as well as any environmental costs. Metal gutter system options would prove to offer good value for money at the disposal period and offer a more environmentally friendly solution as they can be reused or widely and fully recycled without loss of quality for future use and also have a high intrinsic resale and scrap value.

INTRODUCTION

Over the past forty to fifty years there has become an ever-increasing awareness of environmental issues and the need for sustainable development. Everything we do, make, use and discard all interact in complex ways to the physical conditions and life on our planet. Modern industry and transportation are dependent on energy and minerals, and we are becoming more aware that the use of this energy and the mineral resources do have environmental consequences globally.

In the UK, the construction sector and the built environment have a massive environmental impact in terms of resource and energy usage, production of emissions and waste generation. They reportedly account for 45% of total greenhouse gas emissions with a further 10% from materials production. Approximately 32% of landfill waste comes from the construction and demolition of buildings and more worryingly it is estimated that 13% of products delivered to site end up in landfill without being used.

Recycling and the use of recycled material is an important factor in reducing the use of natural resources and the elimination of avoidable waste. The Bureau of International Recycling (BIR) spreads this awareness through the Global Recycling Day initiative and its *Recycling: The Seventh Resource Manifesto* which indicates that recyclables can be viewed as the 'Seventh Resource' in addition to the earth's six major natural resources: water, air, oil, coal, natural gas and minerals. if recycling is not undertaken materials will continue to go to landfill or incinerated never to be used again and natural resources, which are finite will continue to be utilised until exhaustion.

The use of metal gutter systems on a building can contribute to achieving a sustainable drainage solution to meet both current and future needs and requirements, thanks to their low maintenance, long durability, high recycled content, reuse capability and material recyclability.

Steel and aluminium are the most common materials used in metal gutter systems and offer significant advantages. They are produced from materials that have high recycled content from both pre-consumer and post-consumer scrap and can both be reused or recycled repeatedly without losing their qualities as a building material. Percentage wise recovery rates of metals is in the high 90s.

The aim of this MGMA Guidance Document is to provide an overview of the importance of recycling and the recyclability of metal gutter systems and their associated accessories and components.

The document also provides brief background information on some of the external influences and drivers for metal recyclability as part of an overall sustainability strategy, including the Zero Avoidable Waste (ZAW) in construction initiative, life cycle assessments (LCA) and environmental product declarations (EPDs) of products, environmental accreditation schemes and life cycle costing (LCC).

METAL GUTTER SYSTEMS

MGMA members manufacture and supply metal gutter systems in a variety of different metals and forms such as:

- Aluminium
  - Pressed
  - Roll-formed
  - Extruded
  - Cast
- Cast iron
- Mild Steel (e.g. galvanised steel, coil coated steel etc.)
  - Pressed colour coated steel
  - Membrane lined steel
- Stainless Steel
- Copper
- Zinc

The most common materials utilised are aluminium, cast iron, colour coated steel and membrane lined steel with the other metals only being used occasionally.

Paint Finishes

Although it is feasible to supply some gutter profiles in their natural uncoated metal state the majority have painted finishes either pre-coated (i.e. base material coated prior to manufacturing process), or post-coated (i.e. base material coated after manufacturing process). Gutter profiles manufactured from galvanised steel, stainless steel, copper and zinc would generally be supplied in their natural uncoated metal state.

Gutter profiles manufactured in thinner gauges of aluminium and mild steel (e.g. 1.2 mm or thinner) are normally pressed or roll-formed from pre-coated coil with an organic paint coating which provides a decorative finish as well as, in the case of mild steel, providing the protective layer to the base material.

Extruded aluminium, cast aluminium and pressed gutter profiles with thicker gauges of mild steel and aluminium, are manufactured from un-coated material (e.g. mill-finish aluminium) which can be subsequently post coated with a polyester powder coat (PPC) finish to the required colour.

Cast iron gutters can be supplied either ready primed for subsequent painting (e.g. brush or spray applied) on site prior to installation or, preferably, factory painted with a mechanised coating process (e.g. two coat application of primer and top coat) or with a PPC finish.

External Eaves Gutters

Metal gutter systems can be used in various types of locations and application but the most common one is as at the eaves position of the building.

In numerous applications such as domestic, heritage, refurbishment etc. the gutter itself forms a visible feature to the façade of the building (see *figure 1)*. In other applications such as new-build non-domestic (e.g. education, office accommodation, retail, industrial etc) the eaves gutter is positioned behind a metal fascia and soffit system (see *figure 2*).

Figure 1: Typical external eaves gutter

Figure 2: Eaves gutter enclosed by fascia/soffit

In both instances the gutter and other accessories (i.e. support brackets, downpipes metal fascia, metal soffit etc.) are individual components which follow the Design for Disassembly (DfD) principle and can be easily dismantled and dissembled at the end of the building's life and either reused on other similar buildings or collected and sorted for recycling.

Insulated Membrane Lined Gutters

In many industrial applications at valley and parapet wall positions insulated twin-skin membrane lined metal gutter systems are used (see *figure 3)*.

The outer weathering layer is pressed from membrane lined steel sheet consisting of a 1.2 mm PVC, TPO or EPDM membrane pre-laminated on a galvanised mild steel substrate (typically 0.6, 1.2 or 1.5 mm thick). The gutter system is insulated with either PIR (polyisocyanurate) or high density rockfibre insulation, thickness to suit the project's thermal requirements, and has an internal liner pressed from colour coated steel sheet (see *figure 4*). Traditionally this type of gutter system was supplied as a composite unit with the PIR insulation board fully bonded to the outer and inner metal layers. The composite nature of the system allowed the use of thinner galvanised mild steel substrates (0.6 or 1.2 mm) to be used. Composite constructions can be difficult and/or costly to disassemble into separate layers to enable the different materials to be recycled as per their recycling streams. Historically this and similar types of composite construction would be disposed of to landfill sites, however as technology has advanced there are additional recycling processes that have been developed, e.g. from refrigerator and freezer recycling industry, that enable the steel inner and outer layers to be separated from the insulated core. The recovered steel form the internal liner tray can then enter the steel recycling stream although the separated PIR insulation would invariably still be disposed of to landfill. Recycling the external steel liner is much harder due to the fully bonded PVC membrane, but again it is likely that with increasing need to recycle these products, technologies will improve to recycle them.

Figure 3: Insulated membrane lined valley gutter

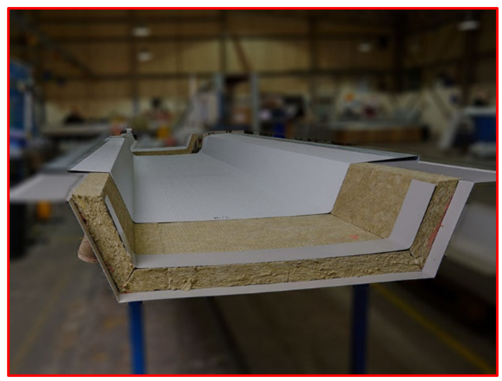


Figure 4: Manufacture of insulated membrane lined valley gutter

Although this type of composite gutter system is still manufactured the use of a factory assembled gutter system utilising loose laid high density rockfibre insulation is becoming more prevalent. As there is no composite structural benefit to the gutter system a thicker outer galvanised mild steel substrate (1.2 or 1.5 mm) is used. However from a recycling point of view this type of insulated gutter system can follow the Design for Disassembly (DfD) principle and can be easily dismantled and dissembled at the end of the building's life and collected and sorted for recycling into the appropriate recycling streams.

METAL RECYCLING

Virtually any material can be recycled, however the actuality of recycling a material is dependent upon several factors involved in its recyclability such as the effort, energy, cost, availability of collection schemes and quality and future potential use for the recovered scrap.

With metal recycling the recovery infrastructure is highly developed and highly efficient and has been in place for decades. The metal recycling industry is very diverse and involves many small companies, usually involved in collection, sorting and initial preparation of scrap metal and large international entities (invariably major metal producing companies) who mainly carry out any final processing required prior to melting, refining and production (e.g. casting, roll-forming, coil coating etc.) into new useable material. The industry has a positive impact on the nation's economy and is a net contributor to the UK's balance of trade as it produces much more scrap metal than is required for the UK market so is often exported for profit.

Metals also have an intrinsic scrap value, (some such as aluminium, copper etc. being higher than others) which also gives a financial incentive to recycle. Metals can also be recycled repeatedly without losing their qualities for further use in the same or similar products.

One of the key factors in metal recycling is the reduction of energy, and subsequent CO2 emissions, that is required to produce material from scrap metal ('secondary' metal) as opposed to producing 'primary' metal from raw materials. In the case of aluminium and zinc this can be as high as 95% reduction, with copper between 60% and 85% and with steel energy reductions can be between 65% and 75%. The use of scrap metal is seen as a valuable resource in the production of new material reducing the need for fewer natural resources.

Metal Recycling – Initial Processes

The following gives an overview of some of the initial processes (prior to final preparation and remelting etc.) involved in the overall recycling process:

Collection

- During manufacturing and fabrication stages off cuts, turnings and surplus materials, can be collected and easily separated into individual grades and qualities of metal. This is known as pre-consumer or 'new' scrap and is often unpainted and contamination free. The material may need some cleaning to remove contaminates such as oils and lubricants.
- Post-consumer or 'old' scrap can be collected at the construction site either during construction (i.e. damaged material, off-cuts etc) or at demolition stage. 'Old' scrap will often be painted and in the case of demolished material will be dirty or contaminated with other material and should be cleaned as necessary. Different types of metal and grades should be sorted separately.
- Composite constructions, e.g. fully bonded insulated gutters, should be separated into their individual layers to enable the different materials to be recycled as per their recycling streams. This can be done manually or in a mechanical process.
- There are several industry organisations and manufacturing companies which operate 'closed-loop' collection schemes for their materials, which can ensure quality of the scrap material back into the manufacturing process for the same or similar types of products. Collection schemes will usually require that materials be clean and free of contaminates.

Sorting/Separation

- Metals will need to be separated from other materials and other metals. Sometimes this is carried out manually but increasingly this process is mechanised.
- One of the advantages of steel is that it is magnetic so making it the easiest metal to recover from mixed waste. Ferrous steel is usually separated from non-ferrous metals by use of magnets, e.g. large overhead magnets, eddy current magnets etc.
- Aluminium can be separated from other non-ferrous metals and other materials in a dense media separator, also known as sink float separation, where waste material is passed through a series of baths which have a water based slurry of increasing known densities. At each bath materials of higher density will sink and those with lower densities will float enabling separation to take place.
- Even though scrap metals may have previously been sorted during the collection stage, further sorting for quality purposes will be carried out at the recycling facility.
- Often final separation will be carried out after cutting/shearing processes.

Compaction/Cutting/Shearing/Bailing

- Scrap metal is often compacted in hydraulic compaction plant to reduce the size of the material for storage prior to carrying out other process.
- Large metal pieces can be cut into smaller pieces with high pressure hydraulic machinery.
- Scrap metal pieces are reduced further in size be shredding in specialised equipment, such as a shear shredder. Shredding the metal into a very small size makes the following melting processes easier.
- Shredded materials are bailed to enable easier handling and transportation of material.

Metal Recycling – New Metal Production

Once the above processes have been carried out and the scrap metal has been sorted, cleaned, shredded and bailed it is transported to the metal processing and/or production companies for melting, refining and production (e.g. casting, roll-forming, coil coating etc.) into new useable material (NB some of the metal producing companies may also be involved in some of the initial processes). As would be expected, the different scrap metals would enter their own specific production industry for the processing into new useable metal.

In each metal production industry there are different melting processes which can be used dependent upon the condition (e.g. uncoated or coated) and quality of the scrap metal. Most of the common materials used in metal gutter systems; steel, cast iron and aluminium will invariably have a paint coating. In the melting process paint and other coatings (e.g. membrane) are destroyed without any environmental impacts allowing the metal to be fully recovered.

Scrap steel is usually melted either as part of the 'basic oxygen steelmaking' (BOS) process or in an electric arc furnace (EAF). The most common steelmaking process is the BOS process accounting for approximately 70% of the world's steel production, whilst the EAF process accounts for approximately 25%. In the BOS process scrap steel is added during the process to supplement the basic steelmaking ores whilst the EAF process only uses scrap steel as its feed stock. In the UK most pre-coated scrap steel will be melted as part of the BOS process whilst most cast iron scrap will be melted using the EAF process.

Scrap aluminium can be melted in either refiners or remelters. The choice of melting is dependent upon the quality/grade and cleanliness of the scrap aluminium. Refiners use scrap aluminium as their feed stock, irrespective of its quality/grade and to some extent its cleanliness, with melting predominantly carried out in a rotary furnace with the scrap melting under a layer of salt which helps reduce the generation of oxides and removes any impurities from the liquid metal. After melting refiners provide aluminium foundries with casting alloys. Remelters use mainly clean and sorted wrought alloy scrap as its feed stock as well as some primary metal, with melting predominantly carried out in a hearth furnace. After melting remelters provide aluminium rolling mills and extruders with wrought alloys for producing rolling slabs and extrusion billets respectively.

'Closed-loop' collection schemes such as that operated by the Council for Aluminium in Building (CAB) aims at the collection of similar grades of aluminium alloys to ensure that the recycled material is processed into the same grade of aluminium e.g. extruded aluminium scrap is recycled back into aluminium extrusion grade billets.

Two-stage chamber furnaces can be used to process coated scrap aluminium, where the coating is burnt away in the first chamber with gas emissions collected in fume capture equipment. The melting of the aluminium takes place in the second chamber.

ZERO AVOIDABLE WASTE (ZAW)

The construction sector, both buildings and infrastructure together, is the biggest producer by volume of waste in the country. The overall reduction of waste, and the minimisation of waste to landfill is vital to improve material resource efficiency.

Zero Avoidable Waste (ZAW) in construction means preventing waste being generated at every stage of a project's lifecycle, from the manufacture of materials and products, the design, specification, procurement and assembly of buildings and infrastructure through to deconstruction. If waste cannot be prevented from occurring then the objective would be that at the end of life, products, components and materials should be recovered at the highest possible level of the waste hierarchy (see *figure 5*) i.e. preparation for reuse of product or component, recycling of material ('closed-loop' recycling is preferable to 'open-loop' recycling), whilst minimising the need for energy recovery or disposal e.g. to landfill.

An interactive Routemap has been prepared by the Green Construction Board (GCB), in collaboration with various government departments (Defra and BEIS). The Routemap aims to catalyse actions by all parts of the supply chain to reduce and ultimately eliminate all avoidable waste. It identifies the action that everyone involved in the construction sector, both public and private, can take to help deliver a lower carbon, more efficient industry.

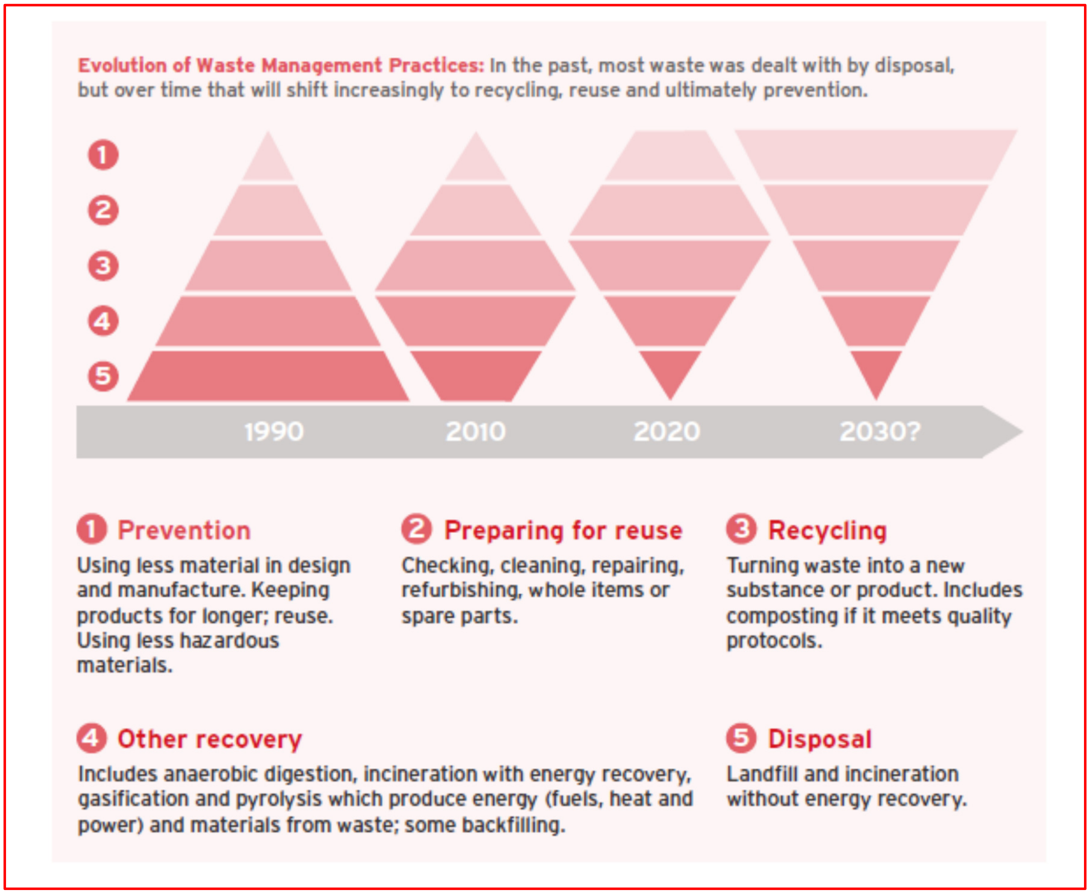


Figure 5 – The waste hierarchy and its evolution (CLC/GBC – Zero Avoidable Waste in Construction)

Waste Hierarchy

Prevention

Waste prevention would include reducing and/or eliminating the type (e.g. hazardous materials) and quantity of waste generated in turn reducing their impacts on the environment and human health. Waste generated in the manufacturing phase can be reduced or even eliminated by recycling material back into the manufacturing process.

From a design perspective the principles of Design for Disassembly (DfD) can be adopted to enable the easy dismantling and disassembly of systems, products and components etc. at the end of the building's life for potential reuse or recovery of materials for recycling.

Prepare for Reuse

Reuse would be where the product is used again for the same purpose but could also include new uses for discarded products. Products, for them to have the potential to be reused, must be carefully dismantled, removed and stored. Preparation for reuse could often involve cleaning, repairing, recoating etc. to ensure that they would be suitable for their reuse purpose.

The reuse of components could lead to the disposal of some parts of the product (ideally for recycling) but the majority of the product is maximised for reuse. This would ideally require products to be designed for disassembly (DfD) to maximise the recovery of materials where extension of product life or component reuse is not feasible.

Recycling

Recycling is where recovered waste materials are reprocessed for use as other products, materials etc. for either original or other purposes. The different types of recycling being:

- Closed loop recycling
    - This is where the recovered materials are recycled to produce the same or similar type and quality of product.
- Open loop recycling
    - This is where the recovered materials are recycled to produce different products, often of an inferior quality.

'Closed-loop' recycling tends to be more beneficial to 'open-loop' recycling such as reducing logistical, sorting, energy and resource inputs as well as maintaining the quality of the recycled material.

Some industry bodies, associations and companies are starting to develop 'closed-loop recycling' schemes. One such scheme operated by the Council for Aluminium in Building (CAB) aims at the collection of similar grades of aluminium alloys to ensure quality of the recycled material; for example extruded aluminium (e.g. 6000 series alloy) scrap is recycled back into aluminium extrusion grade and aluminium sheet (e.g. 1000 series alloy) scrap recycled back into aluminium sheet grade material.

Other Recovery

Other forms of recovery such as energy recovery are at the lowest useful level in the waste hierarchy, for example it is possible to recover energy from some types of materials after they have been discarded. This generally involves burning them to generate electricity or heat which can be used in other processes. This is a "one-off" form of reuse; hence it is low in the hierarchy.

Disposal

It will always be the case that some residual material cannot be recovered and will unfortunately end up in landfill or be incinerated without energy recovery. Two main objectives to minimise this occurrence would be: a) to ensure that the proportion of residuals is kept to a minimum by careful selection of materials and by designing for disassembly: and b) ensuring that any hazardous materials are avoided as far as possible, and where their use is unavoidable, that they are easily identifiable to enable safe and correct disposal to be undertaken.

Metal gutter systems can be easily dismantled and dissembled and reused on other similar buildings. The metals used offer long durability and may only require repainting to extend their decorative life or to change their colour to suit a different decorative colour scheme.

If it not feasible or practical to reuse a metal gutter system, the metals can be recycled repeatedly without losing their qualities as a building product. The recovery infrastructure for metal recycling is highly developed and highly efficient and has been in place for decades. Several metals such as aluminium, copper etc. have a high intrinsic scrap value which also gives a financial incentive to recycle. Percentage wise recovery rates of metals used in construction is in the high 90s.

LIFE CYCLE ASSESSMENT (LCA) AND ENVIRONMENTAL PROFILE DECLARATION (EPD)

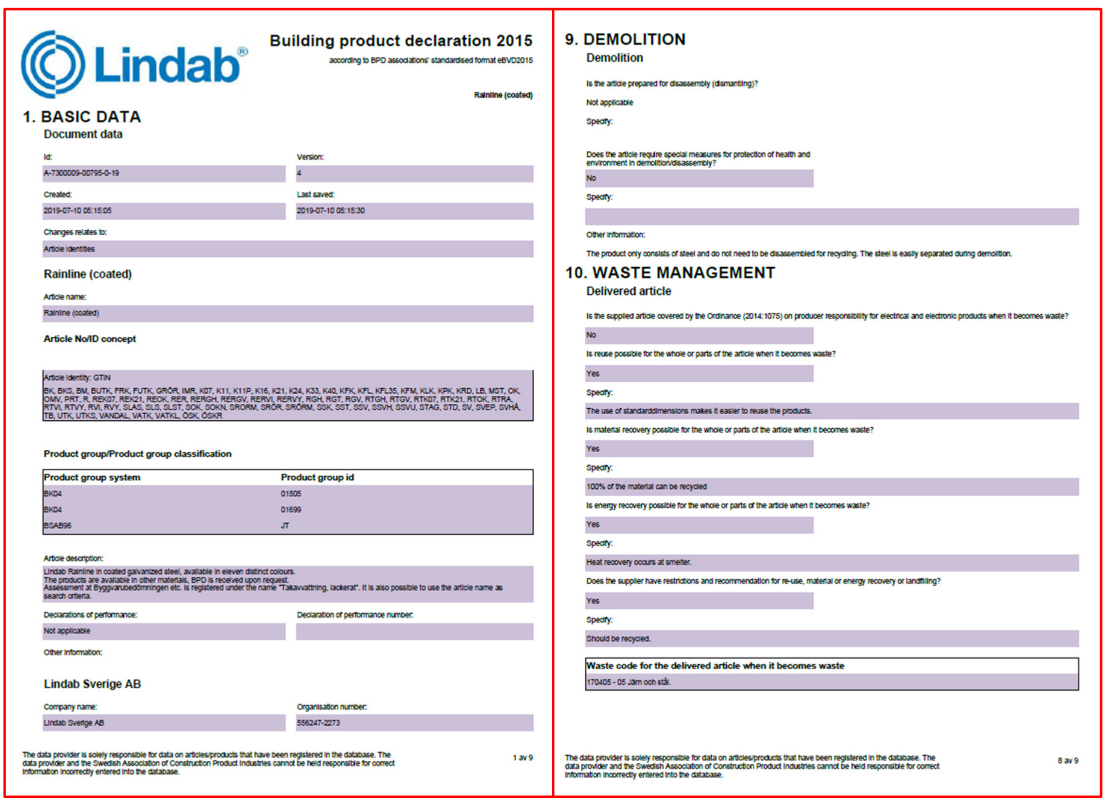
A construction product will have an impact on the environment such as raw material usage, energy usage and release of emissions, through all stages of its life. This is known as its life cycle.

This life cycle of the product is often referred to as 'cradle to grave', where the 'cradle' is the extraction of raw materials and the 'grave' is the product's disposal and will take into account the product's use over the building's life expectancy (usually taken as 60 years).

The results of an LCA are published in an Environment Product Declaration (EPD) which is developed in a common format to the principles and procedures given in ISO 14025. The overall goal of an EPD is to communicate verifiable and accurate information on the environmental aspects of products that are not misleading. An EPD also provides the basis of a fair comparison of the environmental performance of products.

Manufacturers' own LCAs and EPDs are also often broken down further into 'cradle to gate' and 'gate to gate' life cycles. 'Cradle to gate' LCAs assess the environmental impacts of a product prior to it leaving the factory gate and does not consider subsequent life cycle phases. 'Gate to gate' LCAs only consider the environmental impacts during the manufacturing and processing of the product. These forms of LCAs can be useful for a manufacturer as a means of identifying internal processes for environmental improvements.

MGMA members can provide EPDs for their products and systems based on LCAs. *Figure 6* shows extracts from a typical example of an MCRMA member's third party assessed EPD.



Lindab®

Building product declaration 2015

according to BPD associations' standardised format eBVD2015

Rainline (coated)

1. BASIC DATA

Document data

Id: A-7300009-00795-0-19

Version: 4

Created: 2019-07-10 05:15:05

Last saved: 2019-07-10 05:15:30

Changes relates to: Article identities

Rainline (coated)

Article name: Rainline (coated)

Article No/ID concept

Article identity: GTIN

BK, BKS, BM, BUTK, FRK, FUTK, GRÖR, IMR, K07, K11, K11P, K16, K21, K24, K33, K40, KFK, KFL, KFL35, KFM, KLK, KPK, KRD, LB, MST, OK, OMV, PRT, R, REK07, REK21, REOK, RER, RERGH, RERGV, RERVI, RERVY, RGH, RGT, RGV, RTGH, RTGV, RTK07, RTK21, RTOK, RTRA, RTVI, RTVY, RVI, RVY, SLAS, SLS, SLST, SOK, SOKN, SRORM, SRÖR, SRÖRM, SSK, SST, SSV, SSVH, SSVU, STAG, STD, SV, SVEP, SVHÅ, TB, UTK, UTKS, VANDAL, VATK, VATKL, ÖSK, ÖSKR

Product group/Product group classification

Product group system	Product group id
BK04	01505
BK04	01699
BSAB96	JT

Article description:

Lindab Rainline in coated galvanized steel, available in eleven distinct colours.
The products are available in other materials, BPD is received upon request.
Assessment at Byggvarubedömningen etc. is registered under the name "Takavvattning, lackerat". It is also possible to use the article name as search criteria.

Declarations of performance: Not applicable

Declaration of performance number:

Other information:

Lindab Sverige AB

Company name: Lindab Sverige AB

Organisation number: 556247-2273

The data provider is solely responsible for data on articles/products that have been registered in the database. The data provider and the Swedish Association of Construction Product Industries cannot be held responsible for correct information incorrectly entered into the database.

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9. DEMOLITION

Demolition

Is the article prepared for disassembly (dismantling)?

Not applicable

Specify:

Does the article require special measures for protection of health and environment in demolition/disassembly?

No

Specify:

Other information:

The product only consists of steel and do not need to be disassembled for recycling. The steel is easily separated during demolition.

10. WASTE MANAGEMENT

Delivered article

Is the supplied article covered by the Ordinance (2014:1075) on producer responsibility for electrical and electronic products when it becomes waste?

No

Is reuse possible for the whole or parts of the article when it becomes waste?

Yes

Specify:

The use of standarddimensions makes it easier to reuse the products.

Is material recovery possible for the whole or parts of the article when it becomes waste?

Yes

Specify:

100% of the material can be recycled

Is energy recovery possible for the whole or parts of the article when it becomes waste?

Yes

Specify:

Heat recovery occurs at smelter.

Does the supplier have restrictions and recommendation for re-use, material or energy recovery or landfilling?

Yes

Specify:

Should be recycled.

Waste code for the delivered article when it becomes waste
170405 - 05 Järn och stål.

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Figure 6: Example of an MGMA member's EPD

Circular Economy

The 'cradle to grave' life cycle found in LCAs can be viewed as being a linear economy. A variation to this approach is a 'cradle to cradle' life cycle where the disposal stage is replaced with the reuse of the product or a recycling process that produces material suitable for manufacturing a new product. This life cycle approach features in the Circular Economy concept which can be defined as "*an economic system aimed at eliminating waste and the continual use of resources*."

ENVIRONMENTAL ASSESSMENT METHODS

MGMA members' EPDs for their products and systems based on LCAs can assist designers and specifiers to obtain points and credits within environmental rating and certification schemes such as BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design).

The use of assessment methods and rating systems for new buildings can help encourage clients, developers and design teams to design and construct more sustainable buildings which are more energy efficient, climatic responsive, material and resource efficient, have healthier indoor environments for occupants and limit waste emissions and pollution. Various environmental impact factors are assessed against given criteria and credits (BREEAM)/points (LEED) are awarded. The total number of obtained will provide an indication of the environmental friendliness of the building design and operation. Depending on the number of points/credits scored, the building will be certified to have met a specific rating or level.

Some of the credits/points available in various sections and categories of the environmental assessment methods to which the use of metal gutter systems can contribute to relate to the use of materials and waste such as sections Materials (MAT) and Waste (WST) in BREEAM and category Material and Resources (MR) in LEED.

LIFE CYCLE COSTING (LCC)

Life Cycle Costing (LCC) considers all relevant costs over the defined life of a building covering construction costs, operation and occupancy costs, maintenance costs, renewal costs, and end of life costs as well as any environmental costs. This type of analysis provides the opportunity to optimise the allocation of benefits and costs to achieve "best value" over the building design life and would include disposal cost of products at the end of their lives, considering possible benefits of the recyclability of the materials and components.

As well as carrying out an LCC analysis at the whole building level the methodologies can also be utilised at element and product level where the results can be used to assist in the decision-making process when there is a choice of product/system.

Metal gutter system options would prove to offer good value for money at the disposal period and offer a more environmentally friendly solution as they can be reused or widely and fully recycled without loss of quality for future use and often have a high intrinsic resale and scrap value.